Regional Stakeholder Solutions to Empty Container Repositioning Costs in Peripheral Regions

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1. Introduction

Global container movements are increasing in comparison to actual trade, due to increasingly complex liner networks and the need for transhipment. These structures necessitate the repositioning of empty containers across the globe (e.g. from western importers back to eastern exporters) as well as within regions or port ranges (e.g. from feeder ports back to hub ports). This means that both loaded shipments and empty containers may travel much further than necessary if they were to go directly between the two ports nearest to the origin and destination. The number of empty container handlings has risen sharply but the percentage of total handlings has changed little since 2000. In 2011, 20.6% or 122m TEU of containers handled at ports worldwide were empty (Drewry, 2012).

In an ideal scenario, a loaded container would travel from origin to destination, where it would be stripped and then reloaded for export to a new destination. In practice, there is not always an export load waiting; therefore, once a container has been emptied the empty box will be taken back to the nearest port or nominated depot. It may then wait there for a period of time until a local exporter requires it, or it may be sent back or "repositioned" to the Far East, where most exporting is done. Western countries generally are net importers, meaning there are not enough export loads to fill all the containers that arrive there with imported goods. Even if an export load is likely to be available, if the container must sit idle for more than 1-2 weeks then the loss of revenue becomes an issue and the container owner would rather send the container to China where a load will definitely be found.

The problem arising from this system is that containers cost money to move, so the more empty or unproductive moves that take place, the higher the cost. The total cost in 2008 for worldwide empty container repositioning (both land and sea movements) was estimated at US$33 billion (Drewry, 2009). Initially this cost is borne by the shipping line, but, particularly in difficult economic periods, this cost is often passed on to the shipper. Exporters in peripheral regions face a disadvantage compared to better-located competitors who do not have to pay this additional cost. The problem is further complicated in the case of a peripheral exporting region within a country that is an overall net importer. Thus exporters in a peripheral country like Scotland who require the provision of empty boxes have to pay this additional cost, which disadvantages shippers, penalising their trade costs compared to their competitors located near large ports with a greater supply of empty containers without an additional cost.

The majority of papers on this topic use cost optimisation models to find the lowest cost balance of allocation and distribution of containers across a complex system. But the cost must still be paid. Such decisions are often made at the global level to manage containers on a macro scale with little consideration for a small exporting region requiring around 50,000 TEU of empty containers per year. Therefore, most papers on cost optimisation have also treated the decision on a global level (Braekers et al., 2011). This paper will address this gap in the literature by examining how this process can be influenced by local and regional stakeholders, particularly policy makers and planners who seek to support their exporting industries.

This paper takes a regional approach, where the simplest and shortest distance to move a container is known, therefore cost reductions are not the issue. In this case, price is the issue, as when east-west freight rates were high, this repositioning cost was not passed on in full to peripheral shippers. Now that

freight rates are at historic lows, carriers are passing on the full cost, so policy makers have an interest in innovative solutions to reduce the price paid by their shippers.

Sections two and three review the literature on empty container repositioning to establish the reasons for the problem and potential solutions, the vast majority of which relate to cost optimisation models. Section four outlines the qualitative methodology of a single case study based on the Scottish case which is then presented in section five, including a detailed analysis of the movement of empty containers to and from Scottish ports, new structures of feeder shipping via British and continental hubs and inland movements of maritime containers in the context of other unitised trade flows (i.e. road trailers). Challenges identified in this analysis are used as the basis for the interview stage of the research, in which actions by four sets of stakeholders (shipping lines, ports, shippers, public sector agencies) are tested in semi-structured interviews and the findings presented in section six. The results are summarised in section seven, followed by conclusions.

2. Reasons for the empty container repositioning problem

The main cause of the need to reposition empty containers is due to a trade imbalance. It can broadly be stated that exporting regions such as Asia need to pay for empty containers to be brought back from predominately importing Western countries. When Asia-Europe or Asia-North America freight rates are high, shipping lines can afford to move empties back to Asia on low rates. However, when even rates for loaded containers are barely covering costs, the full cost of bringing the empty container back must be recovered from the shipper.

In the case of an exporting region within an overall importing country or port range, the situation is more complex. This is because the empty container is already in the country after being emptied of its imported contents, but the shipping line has to decide if it will transport the empty container a few hundred miles on a feeder vessel to a specific region to serve the exporter, then return the loaded container to the hub port and onwards for global export. This is not always attractive to shipping line managers, as will be discussed more below. Also, for peripheral regions, demand is not high enough to have several empty depots and sources of containers needing to be optimised in a mathematical model. The problem is related to business strategy and influence rather than schedule optimisation.

Container ownership is another important factor. It has been estimated that there exist about three containers for every container slot in the world fleet, to account for overland movements as well as taking up the slack in the system (Rodrigue, 2013). In 2008, at the peak of world container shipping just before the recession, there were about 28 million TEU of containers in existence (UNCTAD, 2009). Most of these are controlled by shipping lines, either through ownership or by leasing them from container leasing companies, who provide flexibility for shipping lines who do not want to take the risk of purchasing too many containers. Shipping lines own approximately 62% and the remaining 38% is owned by leasing companies (Theofanis & Boile, 2009).

The problem with this system as far as this study is concerned is that each container is owned (or at least controlled) by a separate shipping line. So if a Scottish exporter is a customer of carrier A, any boxes from carrier B that are sitting idle at a nearby port are not available to this exporter. The exporter will have to pay carrier A to bring an empty container, while the empty boxes belonging to carrier B may be unproductively repositioned elsewhere to serve carrier B's customers. This results in additional movements and costs. There have been some attempts in the industry to solve this problem, through the use of box pools (so-called "grey boxes" because containers are normally clearly branded for each shipping line), but the problem has not yet been resolved (Theofanis & Boile, 2009). In addition to box ownership, there is also service ownership. For example, some shipping lines use their own feeder services so their boxes will only move on these vessels, whereas other lines will use a multi-box shared feeder service, providing more flexibility on container repositioning options.

The choice of carrier or merchant haulage also plays a significant role. Under carrier haulage, the shipping line has control of the container and can manage repositioning more effectively, incorporating

inland depots or direct transfer to a new customer. Under merchant haulage, the customer must return the empty container immediately to the port or nominated depot. Not only does the carrier have less visibility of the container under this scenario, but the container is more likely to travel unnecessarily long distances because the capacity for triangulation is reduced.

While the overall cause of the repositioning problem is an unresolved trade imbalance, perhaps the largest barrier to resolving the problem is that it has several causes which may not all be relevant in each case, or may be present in varying degrees. It is, first of all, necessary to distinguish between actually not having enough boxes when/where needed, and a situation where they are being provided but at an additional cost.

The first reason for lack of empty containers is a case where there is no service linking the relevant supply and demand ports, or a lack of capacity or frequency on such links. If a line is not already serving this location on its main routings, it can position containers there by altering its feeder routings or by using slots on another feeder line, or, if need be, by leasing additional containers. An additional component of this problem is if services exist but the correct equipment types are not available in sufficient numbers and at suitable times. Second, there is the simple fact of the cost of transporting and handling the empty container, which must be recovered by the shipping line. Third, the opportunity cost of leaving empties waiting for a load or managing such small movements to small exporting regions when it is simpler just to move all boxes on east-west trade routes, empty them then send them back for guaranteed immediate reuse in Asia at a higher freight rate.

3. Potential solutions

3.1 Cost optimisation

Song and Carter (2009) contrast internal efficiency methods (e.g. optimising container movements within the portfolio of a single carrier) with external effectiveness approaches (collaboration between carriers, such as sharing slots or containers). The majority of methodological approaches in the literature address the empty container problem by modelling different location availability, vessel capacities and routings, storage inventory and distribution options and planning horizons (e.g. Crainic et al., 1993; Choong et al., 2002; Olivo et al., 2005; Lam et al., 2007; Chang et al., 2008; Feng & Chang, 2008; Song & Dong, 2008; Francesco et al., 2009; Song & Dong, 2011; Chao & Yu, 2012, Dong et al., 2013). These are generally based on the shipping line owning and managing its own containers, but other studies have explored altering container leasing and purchasing behaviour (Moon et al., 2010; Varshavets et al., 2013) and container pooling between shipping lines (Vojdani et al., 2013). Models have also been extended to include more than one location of an empty storage depot (Lei & Church, 2011; Dang et al., 2013; Olivo et al., 2013) and to encourage reuse of empty equipment without returning first to the port (either direct from shipper to shipper or via an inland depot) (Jula et al., 2006). The limitations of such methodologies are mostly related to necessary data assumptions relating to container size and availability, system knowledge and leasing issues. Additionally, they aim to optimise the current system rather than derive new solutions based on managerial or collaborative decision-making.

Modelling approaches can provide support on which cases suit a particular route, which port choice will lower handling costs and which cases suggest repositioning back to the Far East for high demand and higher freight rates versus leaving them in a more distant port to await an export load. This is useful for a complex system with many nodes and links in which a user desires to find the optimum balance of allocation and distribution. However, such models give little insight into the decision-making process. Such decisions are often made at the global level to manage containers on this macro scale with little consideration for a small exporting region requiring around 50,000 TEU of empty containers per year. This paper will address this gap in the literature by examining how this process can be influenced by local and regional stakeholders, particularly policy makers and planners who seek to support their exporting industries.

3.2 Other solutions

Some innovative ideas that have been suggested include foldable containers and 20ft containers that can join together to form a 40ft container (so-called “tworty” boxes). Several folded empty containers could be transported in place of one regular empty container. Similarly, a tworty could resolve imbalances to some degree by sending two 20ft containers in one direction and a 40ft in the other direction, for regions that have an imbalance of one or the other. Even with the additional handling costs, the large reduction in transport costs means that both options provide the possibility of significant cost savings. This is particularly the case with the foldable containers, whereas the tworty depends heavily on the equipment type requirements on a specific route.

The applicability of foldable containers has been studied by Konings (2005a&b), Shintani et al. (2012) and Moon et al. (2013). While it has been shown that the concept itself is feasible and could save money, widespread adoption of these containers by container lessors and shipping lines is required before the value can be exploited by Scottish shippers. At present, foldable containers are substantially more expensive than regular containers (about double the cost – prices fluctuate but in the region of US$4,000 compared to US$2,000), and enough must be purchased in order for the potential benefits to outweigh the additional complexity of management, for instance by having enough to bundle together and to serve customers without requiring micromanagement. Furthermore, it is not simply the purchase price itself that is the issue; a high purchase price means that lessors will charge a higher rental price, meaning that they must be used intensively and not delivered on speculative routes where they may sit idle for a period of time before being required. This idle time is already a problem with regular containers; with a higher lease charge it would be unsustainable.

These issues could be addressed by a pool of shippers purchasing their own containers, but that could only work on a regular loop back and forth between two destinations. This would involve additional costs and management, compared to regular containers which are repositioned by shipping lines for any customer as required.

Besides the optimisation of operational decisions to lower costs, it is rare for authors to consider managerial or policy solutions, or lobbying to influence global decisions on routing or cost recovery to reduce the burden on peripheral shippers who often do not feature in the thoughts of global decision makers. Lopez (2003) was a rare case of examining the decision-making process of shipping lines, but this was focused on the decision of inland transport of containers. This gap in the literature will be addressed by the current paper.

4. Methodology

The methodology is based on a single in-depth case study of a peripheral exporting region within a country that is an overall net importer. The Scottish case was selected because it is an instructive case where the cost is unavoidable but the price paid by shippers has the potential to be addressed through policy solutions. As almost the entirety of previous discussions in the literature have been based on cost optimisation, this methodology has the potential to produce findings of relevance to other areas facing the same problem.

The study will be framed by the literature review which has revealed the three main causes of the empty repositioning problem. The case study data will be drawn first from a desk study to establish the facts of the Scottish case (section five) and then from semi-structured expert interviews with ports, shipping lines, shippers and public sector support actors (section six). Any potential strategy to resolve the problem will be pursued by one or more of these actors, therefore the analysis will be based on the pros and cons of their actions, before returning these findings to the initial discussion based on the three key causes.

5. The Scottish case

Figure 1 maps all container movements through UK ports in 2011.

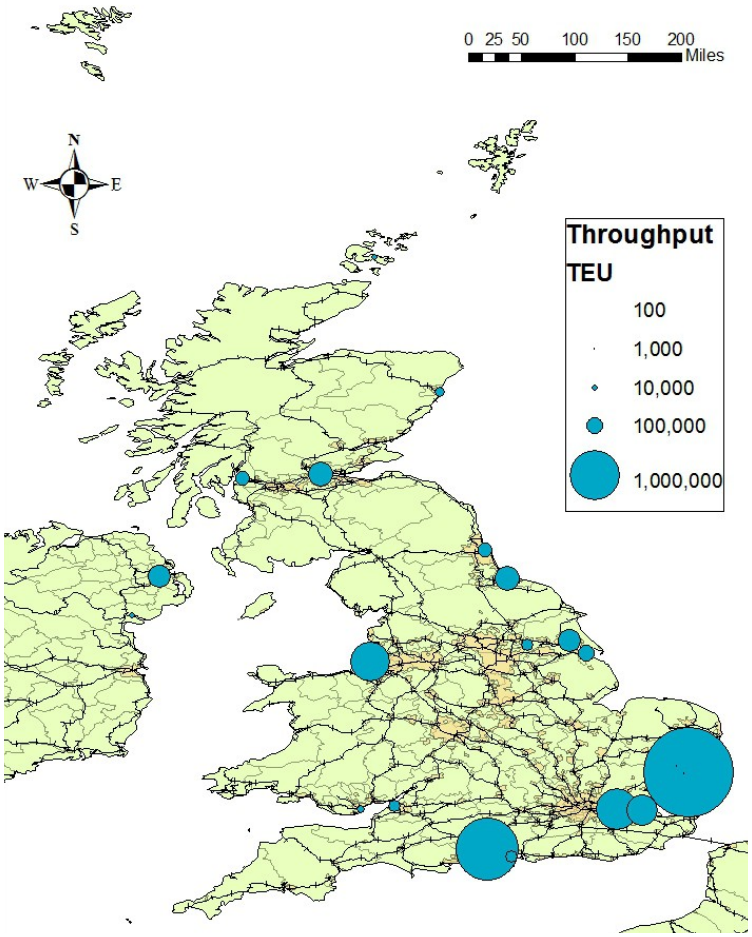

Figure 1. Map of UK showing all container ports in 2011
Source: authors

In 2011, the top 5 ports were responsible for 86% of all container movements, displaying the high concentration in the container port sector. While the UK port system can be seen as mature, Wilmsmeier and Monios (2013) showed that that a number of secondary ports have successfully taken on the “challenge of the periphery” and now seek a strategy that allows them to develop into new regional centres.

Figure 2 shows total inbound and outbound container flows at UK ports since 2000.

Figure 2. Full and empty movements at all UK ports by direction
Source: authors, based on DfT, 2012

The figure shows that inbound and outbound flows are relatively matched overall. Of total flows of 8.1m TEU in 2011, total inbound flows of 4.1m TEU matched total outbound flows of 4.0m TEU. However, the problem is that total loaded movements accounted for only 5.9m TEU, leaving 2.2m TEU of unproductive empty movements. The UK’s 27% proportion of empty containers is the highest of any EU country handling more than 1m TEU annually (Eurostat, 2011).

Figure 2 shows that imports are almost exclusively laden (representing imported goods), while outbound flows are more balanced between full and empty containers (reflecting the large volume of empty containers being repositioned back to the Far East). Thus the UK is shown to be a net importer of goods, in common with many European countries. Some of the empty outbound containers represent repositioning around the UK, for example from Felixstowe or Teesport to Grangemouth, which is the focus of this study, but the majority of outbound empty movements will be going via deepsea routes back to the Far East, as the UK does not produce sufficient exports to fill these containers.

Figure 3 shows empty movements by port and direction in 2011, with Felixstowe and Southampton truncated for ease of presentation.

Figure 3. Empty movements 2011, by port and direction (with Felixstowe and Southampton truncated)
Source: authors, based on DfT, 2012

The figure shows that the only ports that import more empties than they export are Forth Grangemouth, Greenock/Clyde, Goole, Aberdeen, Cardiff and Harwich. The Scottish ports have a significant imbalance, with Grangemouth and Greenock showing serious imbalances. Scottish ports import a disproportionate number of empty containers to fill with whisky exports. Scotland's problem is thus the reverse of the rest of the UK: it is a net exporter (by sea), thus it has a deficit of imported containers.

Looking specifically at Scotland's primary container port of Grangemouth, Figure 4 shows that in 2006, only 12,557 TEU of empty containers were brought into Grangemouth, but as inbound loaded containers declined, the number of empty imports tripled.

Figure 4. Inbound containers at Grangemouth 2006-2011
Source: authors, based on DfT (2012)

The result is similar, although less pronounced, at the primary west coast container port of Greenock. This imbalance is due largely to the centralisation of distribution strategies in large UK hubs; so, for example, in the UK, large distribution centres in the middle of the country receive the majority of British containerised imports, which are then distributed around the country by road and to a degree by rail. This means that the exporting region of Scotland receives most of its imports overland by trailer, with the result that it doesn't then have the empty containers it needs for exporting. Northbound flows are predominately in 45ft pallet-wide road trailers (and swap bodies) and southbound flows are in 20ft and 40ft deepsea boxes either through Scottish ports or by rail to English ports. Scottish exporters thus have to pay shipping lines to bring empty maritime boxes to Scotland, so this is a direct cost to Scottish shippers and by extension the Scottish economy. Thus both industry and government stakeholders have an interest in solving this problem.

Figure 5 shows that, while the majority of empty containers being repositioned to Grangemouth and Greenock are coming from UK ports (and are thus classed as domestic in DfT figures), some are coming from feeder vessels from European ports.

Figure 5. Empty inbound and outbound at Grangemouth 2011, by country of loading/unloading
Source: authors, based on DfT (2012)

The figure reveals that other European ports are sending empty containers to Scottish ports, particularly Belgium and the Netherlands to Grangemouth (the same is true for the west coast but in that case it is from Ireland to Greenock). These are not so surprising; what is of special interest is that 3,508 TEU of

empty containers left Grangemouth for Dutch ports in 2011. This outbound movement of empty containers is part of a shipping line strategy that will be explored in the interviews.

Table 1 lists current liner services calling at Grangemouth, and reveals the connections on which these containers are moving.

Table 1. Shipping lines calling at Grangemouth

Type	Shipping line	Main port	Calls	Vessel(s)
Short sea intra-Europe	Samskip	Rotterdam	Tilbury, Grangemouth, Hull	300/800 TEU
Feeder (open-user)	Unifeeder	Rotterdam/ Hamburg	Felixstowe, Immingham, Tees, South Shields, Grangemouth	700-970 TEU
Feeder (open-user)	BG Freight	Rotterdam/ Antwerp	Grangemouth, Tees	350/800 TEU
Feeder (dedicated)	MSC	Antwerp	Dunkirk, Grangemouth	900 TEU
Feeder (dedicated)	CMA CGM	Zeebrugge	Immingham, Tees, Grangemouth, Rotterdam	700 TEU

Source: authors, based on port information and interviews

An interesting finding form this table is that one is shortsea intra-European (Samskip), two are open-user feeder services (Unifeeder, BG Freight) and two are dedicated feeder links of deepsea lines (MSC, CMA CGM). So a lot of feeder traffic on which empty equipment moves is on multi-user feeder services that carry containers from various shipping lines.

The next issue for vessel provision at Scottish ports is the sulphur emission control area (SECA) in the North Sea becoming more stringent in 2015 (Cullinane & Bergqvist, 2014). The eastern boundary of the SECA zone is at Land's End, but all vessels entering the zone form the Atlantic will not simply be able to switch fuel from HFO to MGO. All but the very largest vessels have a single main fuel tank and a small tank for the MGO which is only used to power generators, etc. while in port. This means that most vessels entering the SECA zone will use only MGO for the entire journey. The cost of this fuel is presently double that of HFO. This makes scrubbers more attractive, but scrubber installation on old vessels in considered less financially viable over the life of the ship than just paying the higher fuel price, although this depends on modelling assumptions and the expected life of the vessel (Jiang at el., 2014).

Figure 6 shows size and age of container vessels calling at Scottish ports in a representative one-month period in 2013.

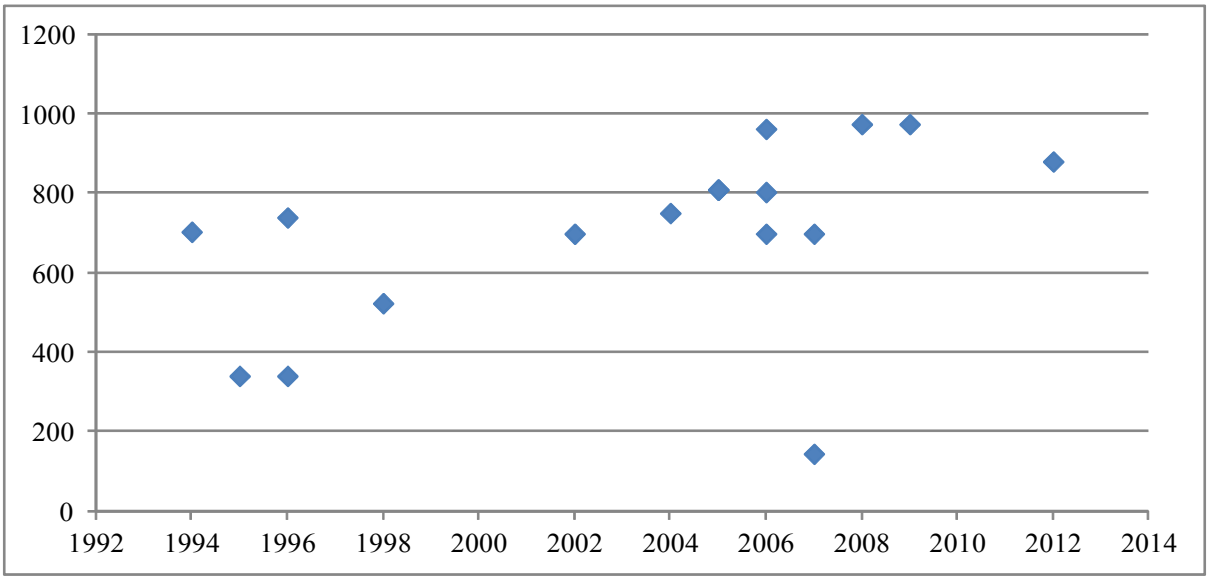

Figure 6. Size and age of container vessels calling at Scottish ports 23 Oct – 22 Nov 2013
Source: authors, based on data from Marine Traffic

The figure reveals that vessel size ranged from 144 TEU to 974 TEU, with an average capacity of 697 TEU. The age distribution shows that most vessels are relatively young, but with a significant amount of capacity around twenty years old. Vessel owners are unlikely to invest in upgrading engines on such old vessels to meet the new sulphur requirements of 0.10% m/m. The choice is then either to use newer vessels with modified engines including scrubbers or to pay the increased cost of switching from HFO to MGO (Jiang et al., 2014). Either way, feeder costs will increase. If the increased costs of shipping leads to fewer containers exported through east coast ports (i.e. Grangemouth) because shippers utilise rail/road to the south or use feeders through west coast ports, then the whole issue of needing empties on the east coast is changed.

Wilmsmeier and Monios (2013) showed how northern ports are pursuing ambitious development strategies to insert themselves as second-tier hubs, such as Liverpool on the west coast and Teesport on the east coast. These will challenge the role for Scottish ports without sufficient capacity for ever-increasing feeder vessel sizes. Scotland's current primary east-coast container port at Grangemouth can handle vessels up to around 1,000 TEU and a proposed new container port at Rosyth is expected to accommodate vessels up to around 1,600 TEU. However, anything larger than that could not be handled and could have knock-on effects on the structure of Scottish supply chains.

6. Strategy analysis

This section presents the results of the interviews, which explored possible strategies available to each group of actors. Strengths and weaknesses of each as well as the practical impediments are presented, with further discussion in section seven.

6.1 Shipping lines

The literature review revealed that the first reason for a lack of empty containers is a case where there is no service linking the relevant supply and demand ports, or a lack of capacity or frequency on such links. If a line is not already serving this location on its main routings, it can position containers there by altering its feeder routings or by using slots on another feeder line, or, if need be, by leasing additional containers. According to the interview results, three scenarios where a shipping line could act are the alteration of service routing, influencing inland depot consolidation and better management of empties at ports.

The Scottish case showed that, while sufficient services exist to Scottish ports, the routings are undesirable. Some services on the east coast move empties from UK ports (including Grangemouth itself) to hub ports on the continent (primarily Antwerp) and then back to Grangemouth. Likewise, on the west coast, the interviews revealed that CMA CGM used to move empties from Liverpool in the UK to Le Havre on the continent then all the way back up the west coast to the Scottish port of Greenock. The shipping line was encouraged through conversations with the port operator to modify their service routing. Now they run a local triangular service linking Liverpool (UK), Greenock (UK) and Dublin (Ireland) that then links with the service that joins the UK and the continent, thus removing the distance travelled by the empty containers and lowering costs. Another example was a feeder service at an Irish port not having sufficient turnaround time to drop its loaded containers and pick up empties so the empties were often left on the quay. Stakeholder discussions encouraged the line to alter the schedule so enough time was allowed. Speaking directly to the shipping lines can, therefore, achieve a change of schedule. While this sounds rather obvious, the fact that routing decisions are taken at a higher level means such local concerns are not always recognised without lobbying by local stakeholders.

Inland consolidation is another option where a shipping line can improve empty container availability. Shipping lines can move the inland empties under a variety of organisational models (e.g. outsource, contract with road or rail companies, etc. – Lopez, 2003), and they may own their own inland depots or more commonly rent space at an inland port or container facility to store their empty equipment. The selection of merchant or carrier haulage can play a significant role as the high incidence of carrier haulage in the UK means that the shipping line decides the inland haul. The location of the majority of empty equipment that travels inland is in the Midlands, and overland transport from there to Scotland is not any cheaper than moving a box port to port by coastal feeder. It could be possible to place containers on empty slots on northbound rail services on the Anglo-Scottish route, but these trains are generally well loaded in that direction. The occasional slot for a handful of containers would not be frequent or regular enough to be built into the management systems of shipping lines.

Better empty management at ports is, in theory, the simplest and easiest option. However, even if successful, this only accounts for a small proportion of required boxes. This has also been tried unsuccessfully before with “grey boxes”. This will only partially resolve the problem, as the shortage in peak season will remain. Yet it only requires administration to be effective and may even provide good PR for shipping lines through the green credentials of reducing empty movements. Another option to improve flexibility is greater use by shipping lines of generic shared user feeder services such as Unifeeder or BG Freight, rather than solely moving their own boxes on their own feeder vessels.

One interviewee suggested that shipping lines could provide better information on box availability to their key customers, through a website or email list. Obviously a shipping line would not make a public announcement of their empty movements, but if they set up a trusted organisation, for example in the Scottish case just a collective of whisky exporters, they could send them daily updates about empty availability to make sure they were all used and none left the port.

6.2 Ports

The scenario of managing empty equipment at ports also involves port actors. Ports with a surplus of outbound empties have an interest in solving the problem, even if it is not directly their problem but that of the shipping lines. Ports charge shipping lines if they leave containers at a port longer than an agreed time. In regions with a surplus of empties, they increase charges to incentivise lines to take them away, but in a region like Scotland with an excess of demand, supportive policies could lower such charges to encourage lines to leave empty equipment at the port until needed. Of course the carriers may have their own reasons for not wanting to leave the empty at the port awaiting a customer if they can get a load elsewhere.

Similarly, port operators charge fees to incoming vessels as well as container handling charges. One interviewee gave an example of a port in Ireland lowering its charges for empty containers in order to ensure they are brought to that port and thus there for their exporting customers. Such a solution can help a small port retain business from exporters. Before that solution, some shippers had been getting

an empty trucked from Dublin and, since the truck was already there with the empty container for them, they would just fill the container and then send it back by truck to Dublin anyway so the port of Cork was losing this business. A regional British port like Teesport would consider such a reduced charge but only if it brought additional business. For example, they might give a discount if northbound empties moved from Teesport to Scottish port Grangemouth and the southbound loaded containers then were feedered from Grangemouth back to Teesport to link with a service there. If the southbound loaded containers from Grangemouth went to another port then there would be no benefit to the operator of Teesport.

6.3 Shippers

It is possible for shippers with complementary equipment requirements to collaborate. In the UK, southbound shippers, particularly whisky exporters, use ISO containers, while northbound flows such as secondary retail distribution moves in road trailers, and to a lesser extent, 45ft curtain-sided swap bodies on rail wagons. A potential solution that has been mooted by stakeholders is the possibility for one or the other to change their equipment usage so that both could use the same. Southbound whisky exporters could send their loads in trailers then transload into containers in the Midlands for onward transport to container ports, and the trailer will then pick up the northbound retail flows. Alternatively, northbound retail flows could move in the empty maritime containers available in the Midlands, then once the load is deposited in Scotland, the empty container will be available for the southbound whisky flow.

This would be a neat solution for two large sectors to work together rather than many small shippers, and such large shippers enjoy strong bargaining power with liner shipping companies. On the other hand, demand for different container types may vary and it can be difficult to match freight flows. Moreover, whisky exporters retender their carrier contracts every year or two, and a change in carrier thus a change in box ownership could destabilise the northbound retail flows which is undesirable for this sector. Another reason this solution has not yet been put into practice is that southbound whisky cargo is very valuable and opening trailers to reload into containers is not desirable. Competition among shippers within the same industry sector could also be a disincentive, as could be the commercial sensitivity of price negotiations.

6.4 Public sector actors and industry associations

Public sector actors can come from a variety of organisations and interest groups, such as actual government agencies or other industry or representative groups such as chambers of commerce (which are usually private sector organisations but will be considered in this section).

The Scottish government already operates grant schemes for both infrastructure and operating costs involved in shifting freight flows from road to rail and water. It could be possible for such schemes to be extended to subsidise empty container movements, but they are in most instances already moving by water, so there is no modal shift. Such a scheme could, however, be justified if it were only available to SMEs in the sense that it is supporting local exporters. It would likely be politically and practically difficult to implement and would not be resolving the issue but merely moving the cost from shippers to the taxpayer.

What the public sector and other supporting actors can do, more profitably, is lobby shipping lines and ports with local knowledge and influence their decisions where possible. It was shown above that shipping lines can be encouraged to alter their service routings and schedule times, and ports can be incentivised to provide discounts where it is in their own interests. There is therefore a role to be played by such organisations in sharing information between stakeholders.

7. Summary of results

The options above can be reduced to four intervention scenarios: establishing a new service or diverting a current service, inland consolidation of containers, empty management at Scottish ports, northbound and southbound shipper collaboration. The analysis has shown that the first can be

influenced by regional stakeholders in the right circumstances, the second and third are not currently feasible because the market is too small, and the fourth is operationally feasible but difficult to implement due to commercial sensitivities.

The results from the preceding analysis can now be summarised according to the three main causes of the empty repositioning problem identified in section two.

7.1 No service linking relevant ports or lack of capacity on such links (or lack of correct equipment)

This problem can be solved by the market but needs information and persuasion from interested stakeholders such as public sector and industry organisations. This can reduce empty equipment travelling longer distances (e.g. Scotland to the continent and back).

7.2 Cost of transport, handling, etc.

This problem will not be solved by the market as shipping lines seek full cost recovery. However, interviews have shown that it is possible to reduce the price charged in some instances if it is in the interest of the port or the shipping line. Again, this can be achieved through persuasion from interested stakeholders such as public sector and industry organisations. Public sector actors could also drive development of empty depots and inland consolidation but this would only be relevant in a region with higher demand than the Scottish case.

7.3 Opportunity cost of leaving empties there

This problem is difficult to solve due to the decision being made at a global level. But again, information sharing between shipping lines and selected customers or a representative can help. Sharing boxes (grey boxes) would be good PR for shipping lines but it is unlikely to happen. Better empty management or sharing of containers between northbound and southbound shippers could also help, but again the interviews have confirmed that they are unlikely to happen in the near future.

8. Conclusion

The first conclusion from the above analysis must, perhaps unsurprisingly, be pessimistic, as the geographical and economic realities causing the imbalance cannot simply be removed. The only way to resolve the underlying trade imbalance is to balance flows of loaded containers, which means increased containerised imports to exporting regions, either on a global level (e.g. western exports into China) or, in this case, regional (e.g. more containerised imports into an exporting region like Scotland).

The second conclusion relates to feasible practical solutions. Two practical solutions were found in the literature (foldable and “tworty” containers), but require greater availability before they can be used successfully. A new practical option was uncovered in this research, being the sharing of equipment between northbound and southbound shippers, so northbound retail shipments could utilise ISO containers rather than trailers and swap bodies, thus providing availability of empty containers in Scotland for the southbound whisky trade. This is operationally feasible, but commercially and institutionally difficult due to sensitivities involved. Like grey boxes, it is an attractive idea that may never be realised.

Even where immediate solutions are not feasible, the experience from the interviews has shown that the situation can be improved. Local and regional stakeholders can lobby shipping lines and ports to achieve better services and lower costs in some instances, where it is in their interests. This is mostly due to the issue of governance scale, where decisions are often made at the global level and local information can result in a better solution for all involved. It suggests that greater knowledge sharing and stakeholder interaction can achieve positive results and should be pursued by public sector actors.

A fourth conclusion is that, not only is the imbalance between exporting and importing regions a difficult problem to solve, but that it is likely to get worse for peripheral regions due to the rising size of feeder vessels resulting from the cascading of ships down from other trades, as well as rising costs from sulphur emissions restrictions, thus favouring larger regional ports. This supports the analysis of Wilmsmeier and Monios (2013) who examined the rise of regional second-tier hubs. Larger continental feeders may call only at Teesport and Liverpool, with onward service to Scotland either overland, or by smaller feeders, which may even be internal moves (e.g. Peel Ports using their own feeder line BG Freight to move containers between their west coast ports of Liverpool and Greenock). Peripheral regions may in future be faced not simply with rising costs of feeder services but fewer direct services, further embedding their peripheral status. Policy actions available to such peripheral regions may therefore be less about reducing empty repositioning costs but more about securing connectivity to second-tier regional hubs.

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